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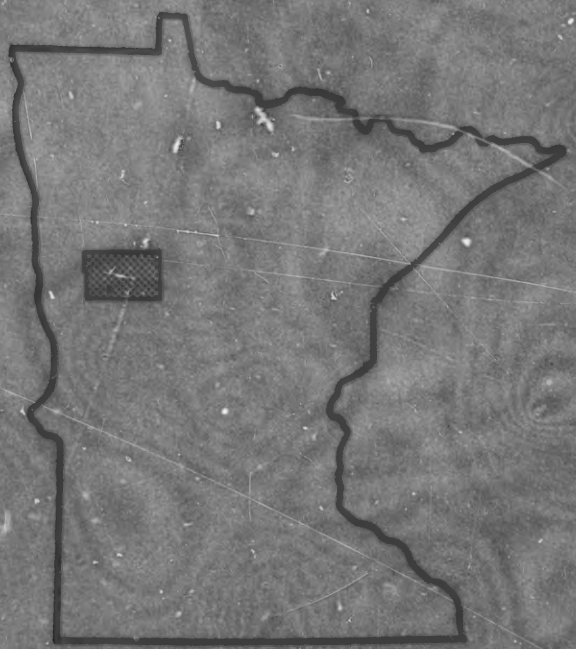
FLOOD INSURANCE STUDY

COMPLETED

ORIGINAL

CITY OF DETROIT LAKES, MINNESOTA

BECKER COUNTY



AUGUST 19, 1986

Federal Emergency Management Agency

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Flood Boundary and Floodway Map

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Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

CITY OF DETROIT LAKES,
BECKER COUNTY,
MINNESOTA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Detroit Lakes, Becker County, Minnesota, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers (COE), St. Paul District (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-E-1153, Project Order No. 1. This study was completed in January 1985.

1.3 Coordination

Streams and lakes requiring detailed study were initially identified during a telephone conversation between the FEMA Region V Office and the Study Contractor. Further details of the study and the establishment of study limits were discussed during subsequent meetings on July 29, 1983, and November 15, 1983, held in the City of Detroit Lakes city offices. Attending the meeting were representatives of the city, the Minnesota Department of Natural Resources (DNR), and the Study Contractor.

A floodway alignment meeting was held in the city offices on November 13, 1984. Attending the meeting were representatives of the city, the Minnesota DNR, and the Study Contractor. Potential Pelican River floodway alignments were discussed and tentative alignments selected.

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On September 25, 1985, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Detroit Lakes, Becker County, Minnesota. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of the Pelican River was studied in detail from the confluence with Detroit Lake to about 1000 feet downstream of State Highway 34. Detroit Lake was studied in detail within the corporate limits.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through January 1990. The scope and methods of study were proposed to and agreed upon by FEMA and the City of Detroit Lakes.

2.2 Community Description

The City of Detroit Lakes is located in southwestern Becker County in northwestern Minnesota. The city is situated approximately 45 miles east of the City of Fargo, North Dakota/the City of Moorhead, Minnesota, and approximately 180 miles northwest of the City of Minneapolis, Minnesota. The 1982 population was reported to be 7,106 (Reference 1).

Detroit Lakes is located in the "412 Recreational Area," which refers to the 412 lakes located within a 25-mile radius of the city. Consequently, tourism provides a major source of income to the economy of Detroit Lakes.

A number of glacial basins formed the present day topography in the Detroit Lakes area. As a result of the glaciation, the topography within the city is characterized by gently undulating hills. The soils within the corporate limits range from sandy to gravelly (Reference 2).

The humid continental type climate of Detroit Lakes is characterized by cold winters and warm summers. Average monthly temperatures range from 4.7 degrees Fahrenheit (F.) in January to 68.2 degrees F. in July. The annual mean temperature is about 39 degrees F. Detroit Lakes averages about 23.9 inches of precipitation per year (Reference 3).

The Pelican River, which originates north of Detroit Lakes, flows in a general southward direction through a well-entrenched channel, until its confluence with Detroit Lake near the city's southeastern corporate limit. The drainage area of the river encompasses a gross area of approximately 40-square miles of which approximately 8-square miles consist of non-contributing, closed drainage basins.

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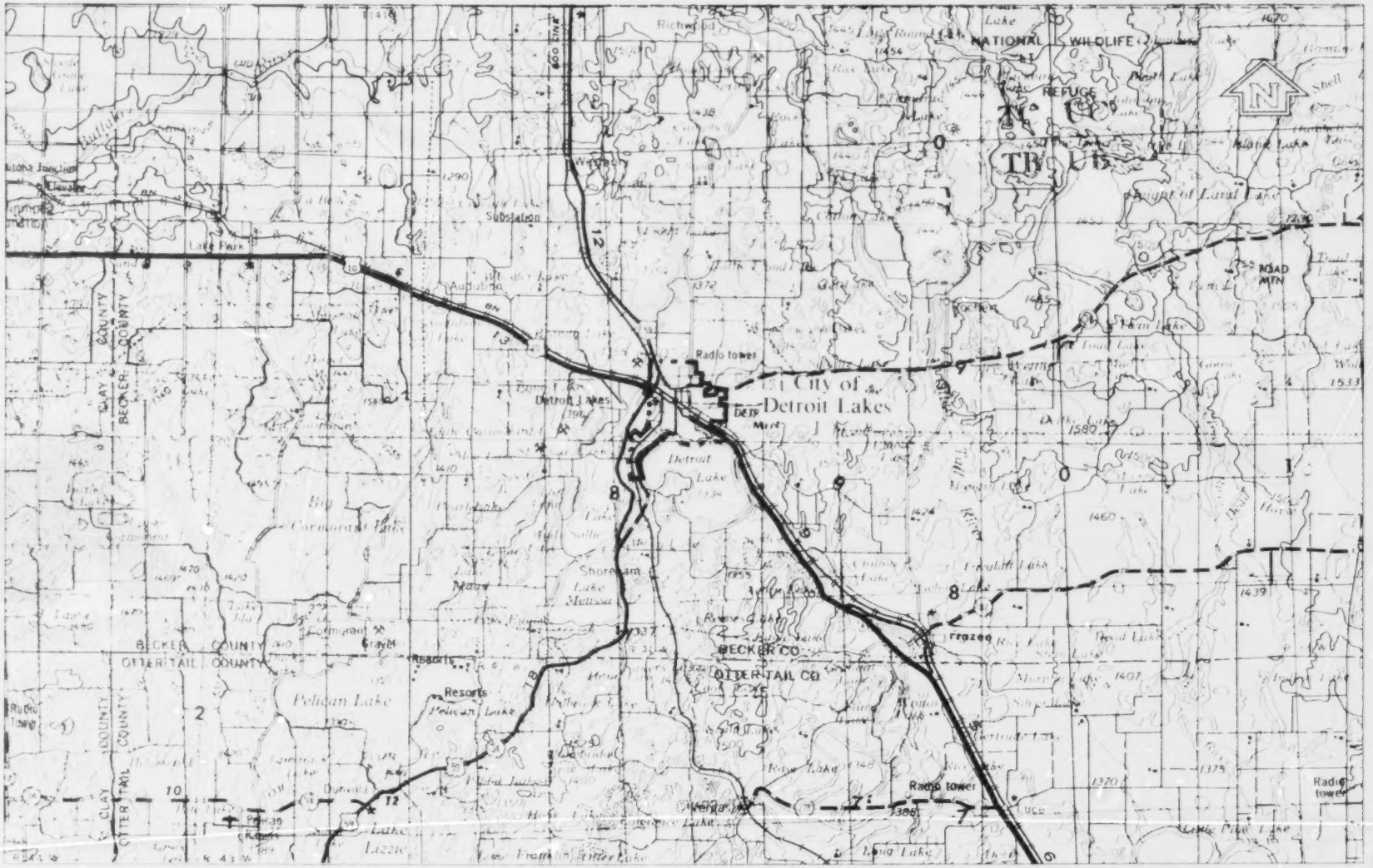

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF DETROIT LAKES, MN

(BECKER CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

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Detroit Lake, which forms the south-southwestern border of the city, is regulated by a control structure near Lake Sallie. The City of Detroit Lakes is primarily responsible for maintaining the level of Detroit Lake. Actual operation of the outlet structure is usually accomplished by Minnesota DNR personnel.

The development adjacent to the Pelican River consists of a mixture of residential, commercial, and industrial structures with residential structures accounting for the largest percentage of development adjacent to the river. Development adjacent to Detroit Lake consists primarily of residential structures with a few scattered resorts and motels.

2.3 Principal Flood Problems

Past flooding on the streams and lakes within and near Detroit Lakes indicates that flooding may occur during any season of the year. However, most of the major flood events are usually the result of heavy spring rains and/or snowmelt.

Low-lying areas adjacent to Detroit Lake and the Pelican River are subject to periodic flooding. Development in the Detroit Lake and Pelican River flood plain areas is limited.

2.4 Flood Protection Measures

Flood protection measures do not exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

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Discharges for the Pelican River at Detroit Lake were computed using the HEC-1 Flood Hydrograph Package (Reference 4). The model was developed for the entire watershed, including all tributaries, down to the outlet of Muskrat Lake.

The U.S. Soil Conservation (SCS) dimensionless unit hydrographs were used to account for runoff from the subbasins, with SCS curve numbers for loss rates. The curve numbers were developed for each subwatershed by the procedures given in the National Engineering Handbook (Reference 5) and reflect an average antecedent moisture condition II. The soil types were determined from the Brainerd Sheet of the Minnesota Soil Atlas (Reference 6). Watershed areas and slopes were determined from the U.S. Geological Survey topographic maps (Reference 7).

Time to peak, T_p, and time of concentration, T_c, were calculated for each subwatershed by the Upland Method given in "Hydrology Guide for Minnesota," Chapter 4 (Reference 8).

The 10-, 50-, and 100-year, 24-hour rainfall were taken from charts and tables in Chapter 1 of Reference 5. The 500-year rainfall was found by extrapolation from the above values. The 10-, 50-, 100-, and 500-year, 24-hour precipitations were applied to the model and distributed as a 24-hour SCS type I rainfall.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
PELICAN RIVER at Detroit Lake	32	215	360	430	620

Analyses were carried out to establish the peak elevation-frequency relationship for each flooding source studied in detail.

The 10-, 50-, 100-, and 500-year lake elevations have been determined for Detroit Lake and are shown in Table 2. Flood routings were done using rating curves developed for the outlet structures near the western edge of Muskrat Lake. The top-of-dam from elevation 1,334.6 to 1,335.5 for approximately 170 feet near the spillway was taken into account in the flow calculations as an emergency spillway. The stop logs were assumed to remain in place at elevation 1,334.0 and the embankment was assumed to fail. Starting water-surface elevation for the routings was set at 1,334.0 feet National Geodetic Vertical Datum of 1929 (NGVD).

The 50- and 100-year, 10-day rainfall were used in the simulations and obtained from Chapter 1 of Reference 8. The 2-year precipitation values were determined from the U.S. National Weather Bureau publication

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Technical Paper No. 49 (Reference 9). The 10- and 500-year rainfall values for 10-day duration were then interpolated and extrapolated, respectively. The 10-day duration of rain was found to be a more critical duration for the lake than the 24-hour storm. These rainfall values were, therefore, applied using a type I rainfall distribution. Because the 100-year, 10-day rainfall is greater than 6.0 inches, the curve numbers in the model were reduced in accordance with SCS procedure.

TABLE 2 - SUMMARY OF LAKE ELEVATIONS

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	LAKE FLOOD ELEVATION (FEET NGVD) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
DETROIT LAKE along shoreline	40	1,335.2	1,335.6	1,335.8	1,336.2

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

The computed flood profiles were based on elevation-frequency relationships for Detroit Lake, in conjunction with step-backwater computations using the COE HEC-2 computer program (Reference 10). A HEC-2 model was developed for a channel reach of 2.53 miles on the Pelican River, starting at the outlet of the Pelican River to Detroit Lake and extending upstream to a point 2,000 feet upstream of State Highway 34.

The channel, bridge, and valley cross sections used to develop the HEC-2 model were field surveyed in 1984 (Reference 11). Road and railroad embankment profiles surveyed at each bridge were also used in the model. In addition, the control structures at the outlet of Muskrat Lake were surveyed for use in development of a rating curve at that point, as described in Section 3.1 Topographic mapping of the study area was developed from 1984 aerial photographs at a scale of 1:2400 with 2-foot contour intervals (Reference 12).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles.

Roughness factors (Manning's "n" values) used in the HEC-2 model were chosen using the 1984 aerial photographs, ground photographs taken during a field investigation, and information obtained in a telephone conversation with the Street Commissioner of Detroit Lakes. The selected channel roughness factor was 0.035. The overbank roughness factors varied from 0.040 to 0.150. The channel "n" was increased by 50 percent for the 10-year flood and decreased by 20 percent for the 500-year flood.

Coefficients of contraction and expansion used for areas other than in the immediate vicinity of bridges were 0.1 and 0.3, respectively. At bridges, the coefficients were increased to 0.3 and 0.5, respectively. The

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coefficients of contraction and expansion in the vicinity of the U.S. Highway 10 crossing were increased further to 0.5 and 1.0, respectively, to account for head loss due to the multiple river crossings in that area. In addition, an orifice flow coefficient of 2.0 was used for the old railroad crossing located immediately downstream of U.S. Highway 10 to adjust for poor flow characteristics between the two crossings.

The starting water-surface elevations for floods of the selected recurrence intervals are the corresponding lake flood elevations for Detroit Lake.

Due to the lack of historical data, the HEC-2 model was calibrated to match a rating curve that was developed for the upstream side of the Burlington Northern railroad crossing, located just upstream of U.S. Highway 10. This crossing controls the elevation of the upstream ponded area. The HEC-2 model matched this curve within 0.1 foot for the discharges considered.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been drawn.

The hydraulic analyses for this study are based only on the effects of unobstructed flow with the exception of the old railroad crossing for the 10-year event. The flood elevations shown on the profiles are, thus, considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD. Elevation reference marks used in this study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:2400 with a contour interval of 2 feet (Reference 12).

For the streams studied by approximate methods, only the 100-year flood plain boundary was delineated using the Flood Hazard Boundary Map for the City of Detroit Lakes (Reference 13). In cases where the corporate limits have changed, topographic mapping was used to delineate the 100-year flood plain boundary (Reference 7).

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The 100- and 500-year flood plain boundaries are shown on the Flood Boundary and Floodway Map. In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. In Minnesota, however, flood plain encroachment is limited by Minnesota Regulations to that which would cause a 0.5-foot increase in flood heights above pre-floodway conditions at any point (Reference 14). Floodways having no more than a 0.5-foot surcharge were delineated for this study.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed and are presented in Table 3, Floodway Data.

As shown on the Flood Boundary and Floodway Map, the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. It should be noted that at some of these cross sections, an administrative floodway was used; i.e., the width was determined by the city. In cases where the floodway and the 100-year flood plain boundaries are either close together or collinear, only the floodway boundary has been shown. Portions of the floodway of the Pelican River lie outside the corporate limits. A floodway is not shown for Detroit Lake because the floodway concept is not applicable to areas of lacustrine flooding.

The area between the floodway and the 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 0.5 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
PELICAN RIVER								
A	130	60	70	6.1	1336.0	1335.0[2]	1335.0	0.0
B	430	35	115	3.7	1337.4	1337.4	1337.4	0.0
C	1200	150	360	1.2	1339.4	1339.4	1339.4	0.0
D	1850	80	310	1.4	1339.7	1339.7	1339.7	0.0
E	2660	60	170	2.5	1340.6	1340.6	1340.6	0.0
F	2825	20	120	3.6	1341.0	1341.0	1341.0	0.0
G	3515	190	390	1.1	1341.7	1341.7	1341.7	0.0
H	4245	210	400	1.1	1344.2	1344.2	1344.2	0.0
I	4915	140	150	2.9	1344.4	1344.4	1344.4	0.0
J	5520	380	370	1.2	1348.0	1348.0	1348.0	0.0
K	6500	610	2220	0.2	1348.1	1348.1	1348.1	0.0
L	7860	165	370	1.2	1348.1	1348.1	1348.1	0.0
M	7980	170[3]	105	4.1	1348.1	1348.1	1348.1	0.0
N	8165	400[3]	610	0.7	1348.7	1348.7	1348.7	0.0
O	8815	350[3]	1200	0.4	1348.8	1348.8	1348.8	0.0
P	9625	540[3]	1180	0.4	1348.8	1348.8	1348.8	0.0

[1] FEET ABOVE CONFLUENCE WITH DETROIT LAKE
[2] ELEVATION WITHOUT CONSIDERING BACKWATER FROM DETROIT LAKE
[3] THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF DETROIT LAKES, MN

(BECKER CO.)

FLOODWAY DATA

PELICAN RIVER

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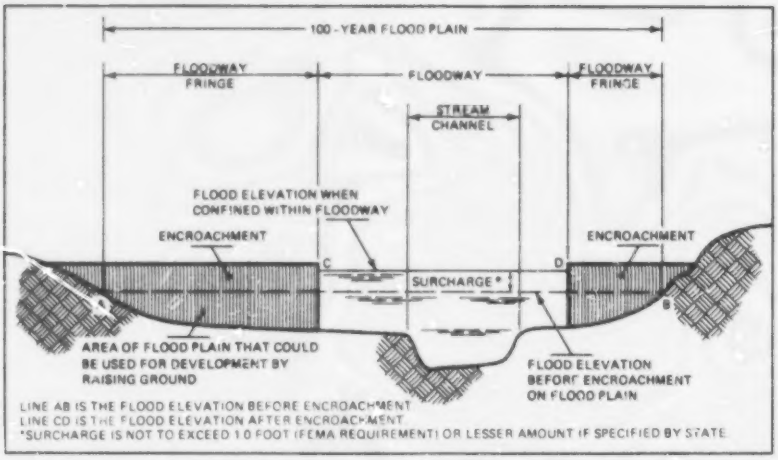
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the City of Detroit Lakes.

5.1 Reach Determinations

Reaches are defined as sections of flood plain that have relatively the same flood hazard, based on the weighted average difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the riverine flooding sources of the City of Detroit Lakes are shown on the Flood Profiles and are summarized in Table 4, Flood Insurance Zone Data.

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5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a riverine reach is the weighted average difference between the 10- and 100-year flood water-surface elevations rounded to the nearest 0.5 foot, multiplied by 10, and shown as a 3-digit code. For example, if the difference between elevations is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.
Zones A1, A3, A5:	Special Flood Hazard Areas inundated by the 100-year flood, with base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- and 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and, areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are shown in Table 4, Flood Insurance Zone Data.

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (FEET NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
PELICAN RIVER							
REACH 1	0001	−0.5	0.0	0.1	005	A1	VARIES—SEE MAP
REACH 2	0001	−1.3	−0.6	0.7	015	A3	VARIES—SEE MAP
REACH 3	0001	−2.5	−0.6	1.9	025	A5	VARIES—SEE MAP
DETROIT LAKE							
REACH 1	0001,0002	−0.6	−0.2	0.4	005	A1	1336

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF DETROIT LAKES, MN

(BECKER CO.)

FLOOD INSURANCE ZONE DATA

12

PELICAN RIVER—DETROIT LAKE

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5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Detroit Lakes is, for insurance purposes, the principal product of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines for riverine flooding sources show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

At the present time, no previous Flood Insurance Studies exist in the area of the City of Detroit Lakes.

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the City of Detroit Lakes (Reference 13).

7.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 300 South Wacker Drive, Chicago, Illinois 60606.

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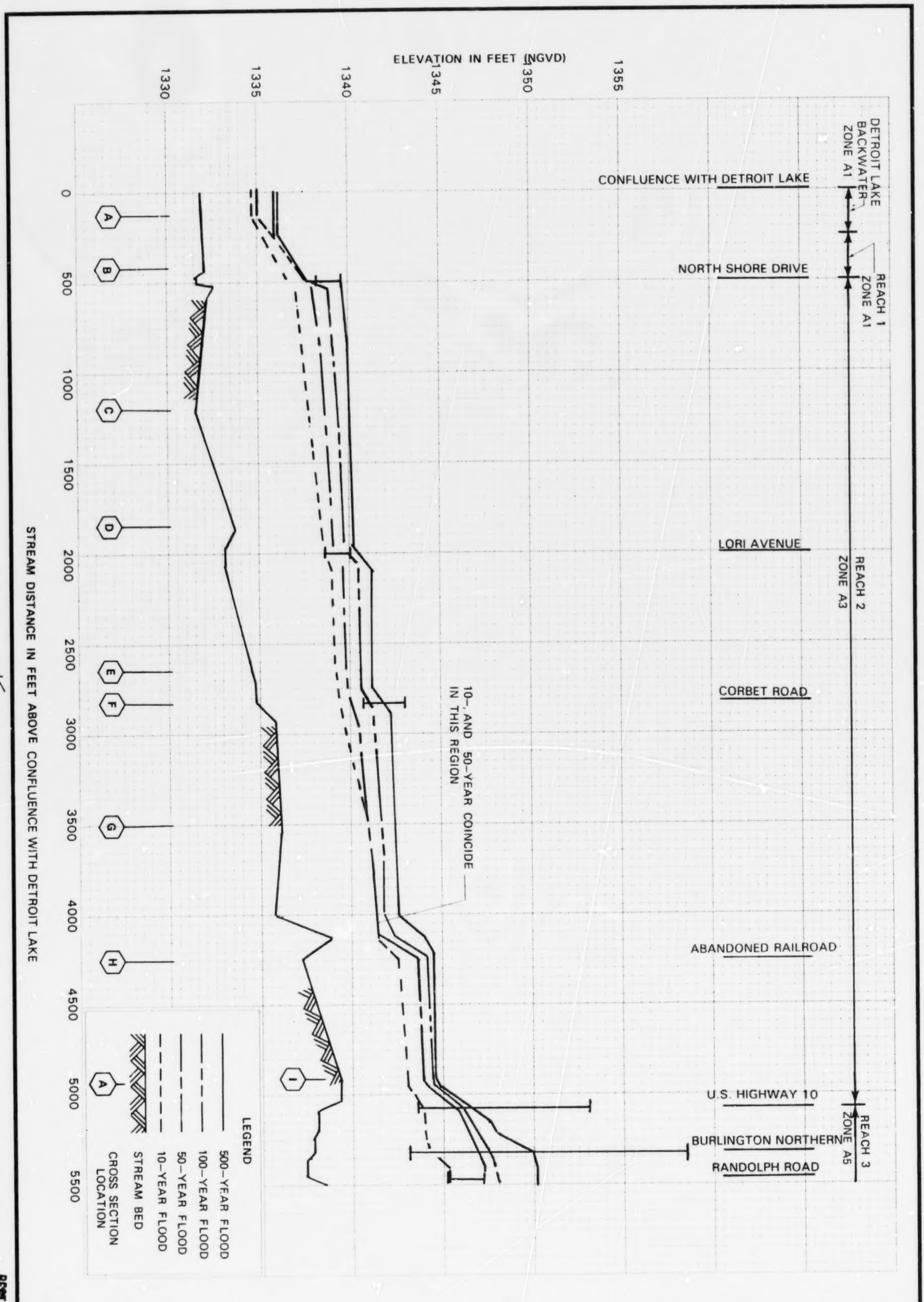

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FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF DETROIT LAKES, MN

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FLOOD PROFILES

PELICAN RIVER

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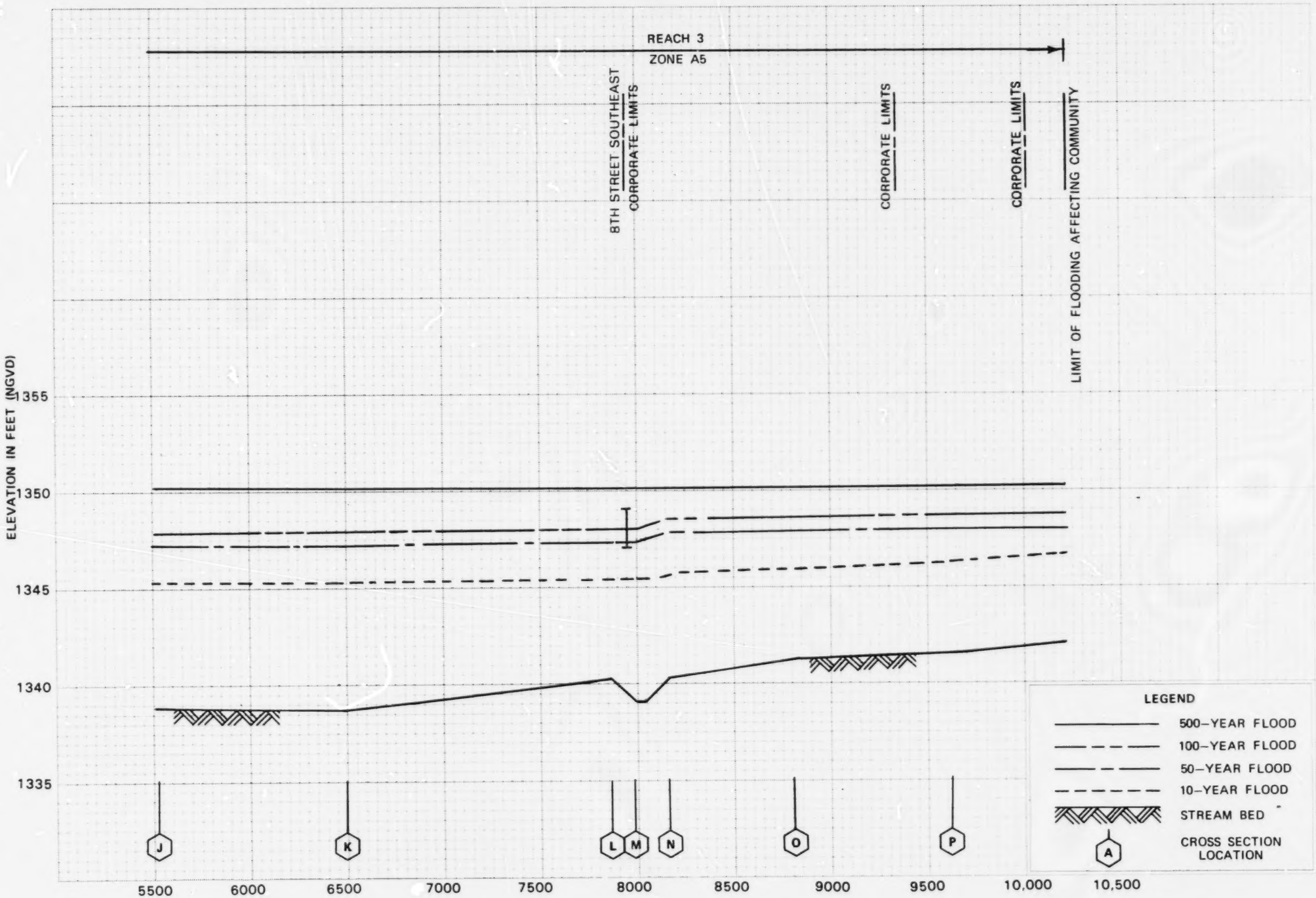

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